

# NASA TECH BRIEF



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## General Purpose Computer Programs for Numerically Analyzing Linear AC Electrical and Electronic Circuits for Steady-State Conditions

Two digital computer programs were developed to assist the electronics engineer in determining the steady-state performance characteristics of linear circuits, both active and passive. The first, an ac analysis program solves for the basic circuit parameters, such as current, voltage, and power. The second, a compiler program solves these circuit parameters and in addition provides a more versatile program by allowing the user to perform mathematical and logical operations, such as calculating the logarithm of the ratio of two node voltages or changing a circuit component value based upon the value of a circuit parameter.

A circuit is described to the computer in terms of parameter types and circuit topology, rather than as a set of equations. A set of matrices is generated from the input data to describe the circuit. These matrices are solved for a set of nodal voltages corresponding to a chosen frequency. These nodal voltages are then used to solve for the parameter voltage drops, currents, and power dissipation. This describes the frequency response of the prescribed parameters for

the given frequency. Partial derivatives are solved directly from the matrices without having to solve the circuit equations. It is assumed that the circuit remains linear at the estimated operating point.

### Notes:

1. This program was written in Fortran IV for an IBM 7094 computer.
2. Inquiries concerning this program may be directed to:

COSMIC  
Computer Center  
University of Georgia  
Athens, Georgia 30601  
Reference: B67-10331

### Patent status:

No patent action is contemplated by NASA.

Source: A. R. Thorbjornsen and R. A. Egebrecht  
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Category 06

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## Geometrical Optics Computer Program for Numerically Analyzing Linear AC Electrical and Electronic Circuits for Steady State Conditions

The program is designed to analyze linear AC electrical and electronic circuits for steady state conditions. It is a computer program that can be used to analyze circuits containing resistors, capacitors, inductors, and dependent sources. The program is written in FORTRAN and runs on a CDC 3600 computer. It is a general purpose program that can be used to analyze any linear AC circuit. The program is designed to be easy to use and to give accurate results. It is a valuable tool for the design and analysis of linear AC circuits.

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